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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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Ex parte TAKAHIRO UNNO

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Appeal 2008-3421
Application 10/054,604
Technology Center 2600

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Decided: January 22, 2009

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Before JOHN A. JEFFERY, KARL D. EASTHOM, and R. EUGENE
VARNDELL, JR., *Administrative Patent Judges.*

EASTHOM, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant appeals under 35 U.S.C. § 134 from the Examiner's rejection of claims 3-5. Claims 1 and 2 have been allowed. No other claims are pending. (Br. 2; Ans. 2).[1] We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

Appellant describes the claimed invention as providing a layered "CELP (code-excited linear prediction) coding with one or more filterings: progressively weaker perceptual filtering in the encoder, progressively weaker short-term post filtering in the decoder, and pitch postfiltering for all layers in the decoder." (Spec. 2: 24-25; 3: 28-31).

Claims 3-5 follow:

3. A layered encoder, comprising:
   (a) an estimator for each layer of a layered encoder; and
   (b) perceptual filters including inverse filters for each layer, wherein at least one of said layer perceptual filters is weaker than another of said layer perceptual filters.

4. A method of decoding a layered encoded signal, comprising:
   (a) applying a short-term postfiltering to a synthesized layered encoded signal wherein the short-term postfiltering differs for at least two of the number of layers decoded to form said synthesized layered encoded signal.

5. A method of decoding a layered encoded signal, comprising:
   (a) applying a long-term postfiltering to a synthesized layered encoded signal wherein the long-term postfiltering is independent of the number of layers decoded to form said synthesized layered encoded signal.

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[1] The Examiner's Answer (electronic notification October 23, 2007) ("Ans.") and Appellant's Brief (filed August 9, 2007) ("Br.") detail the parties' positions.

The Examiner relies on the following prior art reference to show unpatentability:

Gao US 6,961,698 B1 Nov. 1, 2005[2]

The Examiner rejected claims 3 through 5 under 35 U.S.C. § 103(a) as being obvious based on Appellant's admitted prior art ("APA") and Gao.

ISSUE

With respect to claims 3-5, Appellant contends that Gao and the APA "conflict." Appellant also contends that the weak filter teachings of Gao do not relate to perceptual filters with respect to claim 3, and do not relate to encoding with respect to claim 4. (Br. 4).

The issue: Did Appellant demonstrate that the Examiner erred in finding that Gao's teachings apply to the APA decoding/encoding systems, thereby meeting the weak filter element of claim 3, the different filter element of claim 4, and the post-filtering of claim 5?

FINDINGS OF FACT (FF)

1. Appellant admits that layered CELP coding systems are known, including encoders and decoders. Known layered CELP encoders and decoders respectively employ the same PWF (perceptual weighting filter) and LPC synthesis filter for each layer. (Spec. 3:7-21; 6:13-17; "Prior Art" Figs. 2a, 2b).

2. Appellant describes "[p]erceptually filter[ing] the speech s(n) with the perceptual weighting filter (PWF) defined by $W(z) = A(z/\gamma_1)/A(z/\gamma_2)$ to

yield s'(n)." (Spec. 6: 5-6). Appellant states that a short term post filter processes synthesized speech, "sharpens formants," and has "the same form as the perceptual weighting filter but does the opposite." (Spec. 11: item (7)).

3. Appellant's system applies different filters to different code rates. (Spec. 8: item (7); Spec. 11: item (7)).

4. Gao discloses an encoding system 12 and decoding system 16 forming a speech compression system 10. The speech compression system encodes a speech signal 18 and then decodes it. (Fig. 1, col. 6, ll. 22-28). Gao's "embodiments may use the CELP coding technique as a framework . . . ." (col. 4, ll. 36-40).

5. Gao's system first processes speech 18 in a pre-processing unit 34, then in a frame processing unit 44, and then further in processing modules 56-62. (Fig. 2).

6. In modules 56 and 58, a synthesis filter 462 immediately precedes a perceptual filter 466 in a cascaded feedback manner (Fig. 11) in second subframe processing modules 74 and 84 (*compare* Fig. 2 *with* Fig. 11) of an encoder 12 (Fig. 2). Signals processed in a similar synthesis filter 460 are processed in perceptual filter 464 "to provide a first resynthesized speech signal 500." (Gao, col. 52, ll. 63-66, Fig. 11). Multiplying the impulse response (in the frequency domain) of each of two cascaded filters, or convolving the responses (*see* col. 48, l. 65 to col. 49, l. 4), yields the system impulse response for the two filters.

7. Gao discloses introducing a weak short-term spectral filter into the impulse response of the second synthesis filter 462, but only for the half-rate codec 24 (col. 53, l. 59 to col. 54, l. 6). Thus, the filters for the half-rate

processing system 84 are different than the filters for the full-rate processing system 74.

8. Gao teaches that decoding and encoding processes are similar. (Col. 58, ll. 41-43).

9. Gao's filter 98 and post processing module 100 apply to each decoder 90, 92, 94 and 96 (col. 12, ll. 33-41; col. 58, l. 64 to col. 59, l. 4).

10. Gao's system uses different coding techniques and assigns different bit rates (full, half, quarter, eighth) to speech signals of different characteristics. Within a specific full and half-rate encoder, the speech is further encoded and classified differently based upon speech characteristics such as rapidly changing harmonic structure (Type One) or noise-like structure (Type Zero). (*See generally* col. 4, ll. 51 – col. 5, l. 26, col. 9, l. 46 – col. 12, l. 7; Fig. 2). The system selects the best codebook entries depending on parameters including type of code employed, adaptive or fixed. (*See* col. 9, ll. 21-32). Bit allocation and coding is optimized for each frame based on the speech characteristics. The type classification allows the system to assign a bit allocation to improve the perceptual qualities of the speech. (Col. 5, ll. 23-26).

11. Gao's system enhances perceptual quality by modifying a decoder synthesis filter 394 using three different enhancements. One such enhancement involves a short term spectral filter. (Col. 48, l. 57 to col. 49, l. 17; Fig. 10). The synthesis filter 394 is cascaded with a perceptual filter 396 (FF 10).

PRINCIPLES OF LAW

"[T]here must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006). "On appeal to the Board, an applicant can overcome a rejection by showing insufficient evidence of *prima facie* obviousness . . . ." *Kahn*, 441 at 985-86 (Fed. Cir. 2006) (*quoting In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998).

> If a person of ordinary skill can implement a predictable
> variation, § 103 likely bars its patentability. For the same
> reason, if a technique has been used to improve one device, and
> a person of ordinary skill in the art would recognize that it
> would improve similar devices in the same way, using the
> technique is obvious unless its actual application is beyond his
> or her skill.

KSR Int'l Co. v. Teleflex, Inc., 127 S.Ct. 1727, 1740 (U.S. 2007).

"The problem in this case is that the appellants failed to make their intended meaning explicitly clear." *In re Morris*, 127 F.3d 1048, 1056 (Fed. Cir. 1997). "It is the applicant's burden to precisely define their invention, not the PTO's." *Id.*

ANALYSIS

Appellant's and Gao's system both process CELP codes and use different filters for different code rates. (FF 1, 3, 4, 7, 10). The Examiner applied Gao's general teaching of applying different filters to different code rates as an obvious modification of the APA, CELP layered coding system.

(Ans. 3, 5-6, FF 1). The remaining portions of Gao's system are not required to support the rejection, as the Examiner reasoned. (Ans. 5-6).

Therefore, under *Kahn, supra*, Appellant's general allegation that the Gao's and the APA systems conflict does not rise to the level of demonstrating error in the Examiner's position. Moreover, the Examiner specifically noted that such a general allegation that "Gao conflicts . . . amount[s] to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references." (Ans. 6).

Appellant proffered no specific response as to why Gao's teachings regarding different or weakened filters, applicable to CELP codes (FF 4), does not similarly apply to the APA layered CELP codes (FF 1). Although Appellant correctly notes that Gao's system "switches among separate coders for different bit rates," (Br. 4), Appellant does not address the Examiner's findings that Gao's system further analyzes speech within the different coders based on other characteristics to define categories within each coder, and also breaks the categories down to include different fixed and adaptive codes (*see* Ans. 3-6, FF 10). Thus, at a minimum, Gao's weak filter teachings reasonably apply to the APA layered CELP systems, as noted *supra*, but further, though not required for this opinion, Gao's teachings also reasonably imply that Gao's system could also be adapted to process APA layered CELP codes.

Appellant raises no other arguments with respect to claim 5. Accordingly, under *Kahn*, Appellant did not demonstrate error in the Examiner's supported finding that Gao's long term post-filtering (Ans. 5,

citing col. 59, ll. 23-36, *see* FF 9) in combination with the APA system, meets the claim.

Similarly, Appellant does not challenge with any specificity the Examiner's general finding that Gao's weak filter teachings apply to the APA "perceptual filters" recited in claim 3, and are involved in the APA layered CELP coding system. (Ans. 5-6, FF 1). While Appellant does state that Gao's teachings apply to spectral filters (Br. 4 – *citing* Gao, col. 54, ll. 1-4), that particular Gao passage teaches introducing spectral filter responses into other filters, such as Gao's synthesis filter. (FF 7). Under *Morris*, *supra*, Appellant's mere denial that the prior art does not teach Appellant's term does meet Appellant's burden of defining the term.

In any event, Gao's synthesis and perceptual filters are cascaded together (FF 6, 11). Skilled artisans would have recognized that Gao's teachings (*see* FF 7) would have suggested modifying either filter in the chain, because the overall frequency response of the chain remains the same regardless of which filter contains the weakened filter response (*see* FF 5).

Moreover, as noted *supra*, Appellant does not define the "perceptual filters" recited in claim 3, but rather, discloses that a "perceptual weighting filter" has the same form as other filters. (FF 2). However, claim 3 does not recite "perceptual weighting filters." Claim 3 merely recites "perceptual filters including inverse filters." Therefore, assuming *arguendo* one of skill would not have modified Gao's or the APA perceptual filters, the claim reasonably embraces Gao's synthesis filter as included in a cascaded perceptual filter chain.

Additionally, Gao specifically refers to enhancing perceptual quality by modifying a synthesis filter in the decoder with a weak filter (FF 11), and

also generally discloses improving perceptual qualities of speech without specific relation to any perceptual filter (FF 10). Such references further imply a broad definition for "perceptual" processing or filtering that includes Gao's synthesis filters.

Appellant's statement that Gao's weakened filter teachings "relate[] to the excitation encoding, not the decoding of claim 4" (Br. 4), fails to address the Examiner's finding that Gao's decoding and encoding systems employ similar processes (Ans. 6, FF 8). In any event, Gao specifically introduces a weak short term spectral filter into the decoder (FF 11), contrary to Appellant's argument.

Gao's system, in combination with the APA, meets claim 4 for an additional reason. Appellant's statement limiting Gao's teachings to the encoder ignores the fact that Gao's decoding and encoding subsystems constitute one speech compression system (FF 4). Claim 4, reciting decoding in the preamble, does not preclude encoding. To the contrary, similar to Gao's system, claim 4 implies encoding occurs as a first step of the decoding process. That is, claim 4 recites "at least two of the number of layers . . . to form said synthesized layered encoded signal."

As such, Gao's weak filters in the encoder also apply to claim 4. That is, Gao's encoder *resynthesizes* speech in a feedback loop stage after processing the speech first in several previous stages (FF 6, 7). Such resynthesized speech implies synthesized encoded speech - as synthesized and encoded in Gao' initial processing stages and/or cascaded feedback stage (*see* FF 5-7). Therefore, Gao reasonably suggests, in combination with the APA layered encoded signals, "applying a short-term postfiltering to a synthesized layered encoded signal," as also recited in claim 4.

The Examiner's cumulative rationale amounts to a finding that applying Gao's CELP weak, different, and postfilter teachings to the APA layered CELP system predictably improves similar devices in the same way by applying different or the same filter processing techniques to differently coded speech. As such, under *KSR* and *Kahn*, Appellant failed to demonstrate error in the Examiner's findings.

CONCLUSION

Appellant did not demonstrate that the Examiner erred in finding that Gao's teachings apply to the APA decoding/encoding systems, thereby meeting the weak filter element of claim 3, the different filter element of claim 4, and the independent postfiltering element of claim 5. Accordingly, we sustain the 35 U.S.C. § 103 rejection of claims 3-5.

DECISION

The Examiner's decision rejecting claims 3-5 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv)(2006).

AFFIRMED

gvw

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